

Detection of Passive Integrated Transponder (PIT) tags on piscivorous bird colonies in the Columbia River Basin, 2000

***Fish Ecology
Division***

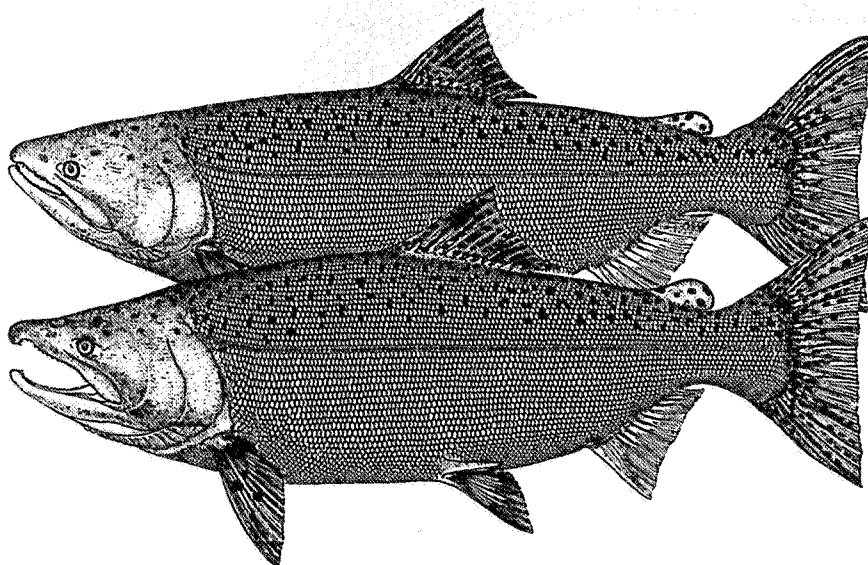
***Northwest Fisheries
Science Center***

***National Marine
Fisheries Service***

Seattle, Washington

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and Richard D. Ledgerwood,

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for

Walla Walla District
U.S. Army Corps of Engineers
201 North 3rd
Walla Walla, Washington 99362-1876

Delivery Order W68SBV806ZZ741

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EXECUTIVE SUMMARY

In 2000, we modified passive integrated transponder tag (PIT tag) equipment previously used in water to detect PIT tags deposited on land by piscivorous birds after they consume juvenile salmonids. Along with researchers throughout the Columbia River Basin, we adapted all equipment to work with the 134.2-kHz PIT tag approved by the International Organization for Standardization. Three techniques were used: manual sifting, an automated flat-plate antenna dragged over the surface of bird colonies with a four-wheel-drive vehicle, and a hand-held, pole-mounted antenna passed over smaller nesting areas that were inaccessible to the vehicle.

We detected PIT tags from 14 bird colonies on 11 islands and 5 channel markers in the Columbia River Basin. The piscivorous bird colonies sampled were Caspian terns (*Sterna caspia*), double-crested cormorants (*Phalacrocorax auritus*), gulls (*Larus* spp.), American white pelicans (*Pelecanus erythrorhynchos*), and three species of herons (*Ardea alba*, *A. herodias*, and *Nycticorax nycticorax*).

A total of 53,620 PIT-tag codes from migration year 2000 were detected, representing 4.2% of the total 1,284,103 PIT-tagged salmonids released in 2000. Of all fish PIT tagged and released into the Columbia River Basin to migrate in 2000, these tags accounted for 9.9% of steelhead (*Oncorhynchus mykiss*), 4.2% coho (*O. kisutch*), 2.7% of chinook (*O. tshawytscha*), and 1.7% of sockeye salmon (*O. nerka*).

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INTRODUCTION

A passive integrated transponder (PIT) tag is a microchip containing a unique electronic code bonded to an antenna coil that is sealed in a glass cylinder. Miniaturized PIT tags, 2.1 mm in diameter and 12 mm long, were developed for implantation in the body cavity of salmonids to monitor their migration in the Columbia River Basin (Prentice et al. 1990). When a PIT tag comes within range of an energized magnetic field created by an antenna, it transmits its unique code and the time and date of passage to the receiving antenna without the fish being handled (Nunnallee et al. 1998).

After tagging, the individual tag code is recorded, along with key information about the tagged fish, and these data are uploaded to the Columbia Basin PIT Tag Information System (PTAGIS), a regional database (PSMFC 1996). Subsequent detection information is also automatically uploaded to PTAGIS, which is maintained by the Pacific States Marine Fisheries Commission.

Researchers from Oregon State University (OSU) and the Columbia River Inter-Tribal Fish Commission (CRITFC) have estimated that piscivorous birds nesting on islands in the Columbia River Basin consume millions of migrating juvenile salmonids annually (Roby et al. 1998). In 2000, over 1 million juvenile salmonids were PIT tagged and released into the Columbia River Basin (PSMFC 1996), and many were consumed by piscivorous birds and the tags deposited on roosting or nesting areas.

Based on our experience with the electronic detection of 400-kHz PIT tags from piscivorous bird colonies (Ryan et al. 2001), we developed a study to automate 134.2-kHz PIT-tag detection on these colonies in 2000. Study objectives were as follows:

- 1) Modify 134.2-kHz water-based PIT-tag detection equipment to detect PIT tags from land.
- 2) Substantially increase the number of PIT tags detected from bird colonies.
- 3) Use the increased numbers to evaluate the proportion of PIT tags released into the Columbia River Basin and subsequently detected on piscivorous bird colonies.

The PIT-tag detection data summarized in this report have been uploaded to the PTAGIS regional database as mortality files and are available to the public. This report is intended to provide summary data and totals, enabling users of the regional database to confirm numbers obtained from that source.

STUDY SITE

Our study site ranged from East Sand Island, 8 km from the mouth of the Columbia River, to Solstice Island in Potholes Reservoir, approximately 40 km from the Wanapum Reservoir in the Columbia River (Fig. 1). The sampling locations within our study site consisted of 14 bird colonies on 11 islands, and 5 channel markers.

Columbia River Estuary

East Sand Island (RKm 8) hosted a colony of Caspian terns (*Sterna caspia*) and a separate colony of double-crested cormorants (*Phalacrocorax auritus*). The tern colony contained about 8,500 breeding pairs on 1.2 ha of open sand (Collis et al. 2000). The cormorant colony hosted about 7,000 breeding pairs (Collis et al. 2000) on a jetty of large boulders, 500 m long by 30 m wide. Rice Island (RKm 34) hosted a colony of about 1,200 breeding pairs of Caspian terns (Collis et al. 2000) on 0.7 ha of open sand.

Five channel markers situated around the navigational channel between RKm 33 and RKm 37 were used by 70-80 breeding pairs of double-crested cormorants (Cindy Anderson, OSU, Pers. commun., February 2000). These channel markers had 4-m² platforms with 1-m hand rails and were elevated 3-10 m above the surface of the water.

The Dalles Dam Reservoir

Little Memaloose Island (RKm 314) is a small rock island (0.2 ha) that hosted a gull (*Larus* spp.) colony with a population index¹ of 300. Little Miller Island (RKm 331) hosted a gull colony with a population index of 1,700 on several small rock outcroppings (0.5 ha).

John Day Dam Reservoir

Three Mile Canyon Island (RKm 412) hosted tern, gull, and heron (*Nycticorax nycticorax*) colonies. The tern colony had a population index of 500 on 0.05 ha of open sand; however, the nest site was abandoned in early June due to predation by a mink (*Mustela vison*) (Collis et al. 2000). The gull colony had a population index of 10,000 on a combination of a grassy field and sparsely vegetated rocky substrates (0.5 ha). The heron colony had a population index of 200 in 0.1 ha of deciduous trees.

¹ Population index is based on a direct count of adult birds on the ground late in the nesting season, resulting in an estimate of breeding pairs. All estimates of gull, heron, and American white pelican populations were provided by David Craig, Willamette University (Pers. commun., February 2001).

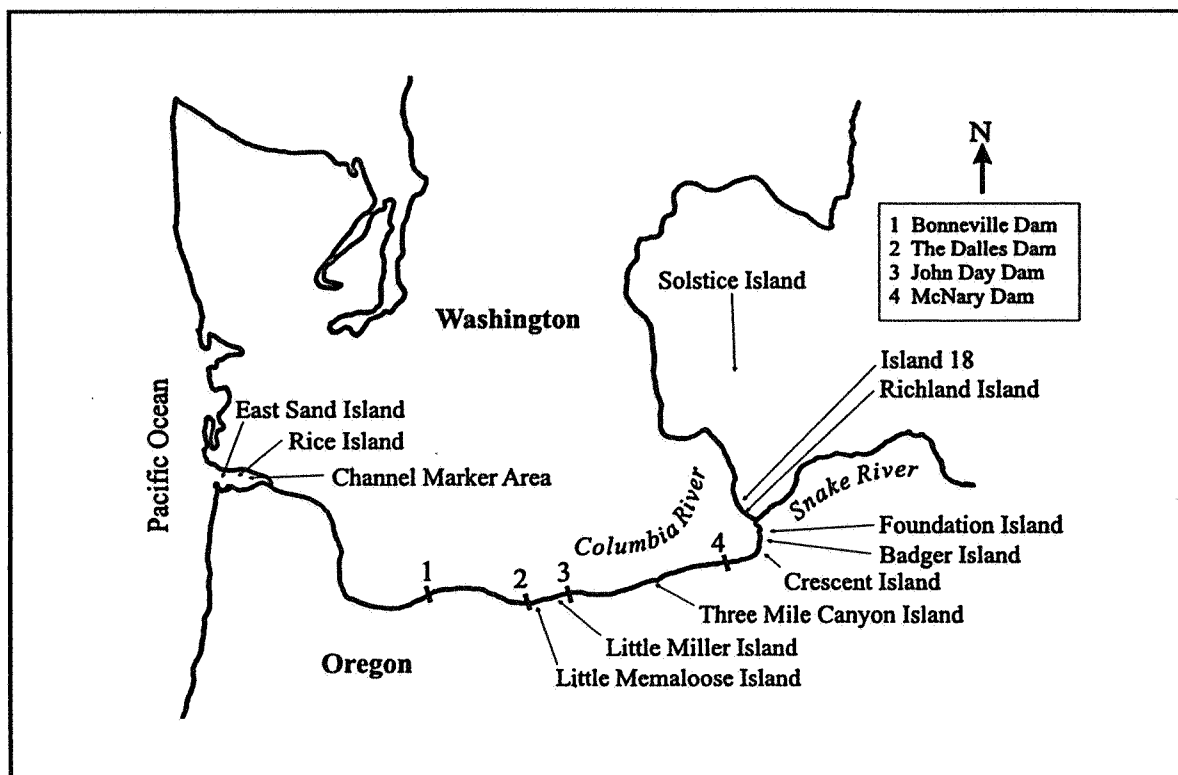


Figure 1. Locations of avian nesting areas where PIT tags were detected in the Columbia River Basin, 2000.

McNary Dam Reservoir

Crescent Island (RKm 509) hosted a tern colony with a population index of 600 on 0.1 ha of open sand. Badger Island (RKm 512) hosted an American white pelican (*Pelecanus erythrorhynchos*) colony with a population index of 200 on 0.1 ha of open sand. Foundation Island (RKm 519) hosted cormorant and heron (*Ardea alba*, *A. herodias*, and *N. nycticorax*) colonies with population indexes of 400 and 200, respectively in 0.2 ha of deciduous trees. Richland Island (RKm 545) and Island 18 (RKm 549) hosted gull colonies with population indexes of 19,000 and 12,000 on 1.0 and 0.5 ha of cobble, respectively.

Potholes Reservoir

Solstice Island is a small sand island in Potholes Reservoir approximately 40 km from the Wanapum Reservoir in the Columbia River. Solstice Island hosted a tern colony with a population index of 400 on 0.05 ha of open sand (Collis et al. 2000).

METHODS

Caspian terns, double-crested cormorants, and gulls were identified as piscivorous birds with the potential to impact juvenile salmonids in the Columbia River Basin (Ryan et al. 2001). American white pelican and heron colonies were sampled because logistics permitted sampling with no extra cost to the project. During the spring nesting season (April-July), NMFS, OSU, and CRITFC researchers established the boundaries of predatory bird colonies for each species by location and number of nesting birds. Colony location, bird species, and date and time of detection were recorded for each individual PIT-tag record. We sampled piscivorous bird colonies where there were estimated to be 50 or more nesting pairs in a confined area and in areas having potentially high impact to Columbia Basin salmonids. Tags detected outside the established boundaries of the colonies were recorded as unknown predator species.

The flat-plate antenna was used to detect PIT tags from all of the tern colonies and from the gull colonies on Three Mile Canyon Island, Richland Island, and Island 18. Pole-mounted antennas were used to detect PIT tags from all of the cormorant, heron, and pelican colonies, as well as the gull colonies on Little Memaloose, Little Miller, and Three Mile Canyon Islands. Protocols described by Ryan et al. (2001) were used for the flat-plate and pole-mounted antenna detectors, with the exception that two passes were made on Little Miller and Little Memaloose Islands, and three passes were made on the East Sand Island cormorant colony.

Additional detection of PIT tags by manual sifting was performed by researchers from the U.S. Geological Survey, OSU, Chelan County Public Utility District, and Real Time Research, Inc. PIT tags in the soil on Little Memaloose, Little Miller, and Solstice Islands were manually sifted through a sieve to recover visible tags prior to electronic recovery. These data are included in this report to supply a complete summary of PIT tags that we uploaded to the PTAGIS database.

Detection efficiency was evaluated by planting PIT tags with known codes on the East Sand Island tern and cormorant colonies and then calculating the percentage of these tags detected. In early April, 449 tags were planted on the tern colony at the beginning of the nesting season. In August, an additional 197 tags were planted on the tern colony after the birds abandoned the colony and immediately prior to detection efforts. In addition, 298 tags were planted on the cormorant colony in October, after the cormorants had abandoned their nests and immediately prior to detection efforts.

Tags were not planted on the cormorant colony at the beginning of the nesting season due to the lack of nesting material to retain the tags. Tag-reading depths for the 134.2-kHz flat-plate and pole-mounted antennas were evaluated at 0, 2.5, 5, and 7.5 cm as described by Ryan et al. (2001). The 134.2-kHz flat-plate antenna was evaluated on the East Sand Island tern colony. The pole-mounted antennas were evaluated on Clatsop Spit, a sandy beach south of East Sand Island on the Columbia River, because substrate on the cormorant colony was primarily rock, making it infeasible to bury test tags.

RESULTS

A total of 53,620 juvenile salmonid PIT-tag codes designated for the 2000 migration year were detected on piscivorous bird colonies in the Columbia River Basin, representing 4.2% of the 1,284,103 PIT-tagged salmonids released in 2000. Of these tags, 38,552 were detected in the Columbia River Estuary, 3,785 in The Dalles Dam Reservoir, 1,489 in John Day Dam Reservoir, 7,682 in McNary Dam Reservoir, and 1,647 in Potholes Reservoir (Tables 1 and 2). These tags accounted for 9.9, 4.2, 2.7, and 1.7% of the PIT-tagged steelhead (*Oncorhynchus mykiss*), coho (*O. kisutch*), chinook (*O. tshawytscha*), and sockeye salmon (*O. nerka*) released, respectively (Table 3 and Appendix Tables A1-A6).

Detection efficiency on the East Sand Island tern colony was 94% of the 449 PIT tags planted on the colony at the beginning of the nesting season and 99% of the 197 tags planted on the colony after the nesting season. The detection rate on the East Sand Island cormorant colony was 91% of the 298 PIT-tags planted on the colony after the

Table 1. Migration year 2000 PIT-tagged juvenile salmonids released into the Columbia River Basin above the designated river kilometer (RKm), and the number of released tags detected.

Reach of 1st detection ^a	River kilometer of 1st detection (RKm) ^b	Number released (n) ^c	Number detected	
			(n)	(%)
Columbia River Estuary	37	1,284,103	38,552	3.0
Dalles Dam Reservoir	331	956,577	3,785	0.4
John Day Dam Reservoir	412	954,329	1,489	0.2
McNary Dam Reservoir	549	879,293	7,682	0.9

a. All PIT-tag detection locations in the designated reach.

b. River kilometer of the most upstream detection location in the designated reach.

c. PIT tags released into the Columbia River Basin above designated river kilometer.

d. PIT tags detected in the designated reach.

Table 2. Totals by reach of PIT-tagged juvenile salmonid detections on piscivorous bird colonies in the Columbia River Basin during the 2000 migration year. Tag detections are sorted by avian species and include tags from salmonids released both upstream and downstream from the avian predator colony.

Detection Location ^a	Caspian tern (n)	Double-crested Cormorant (n)	Gull (n)	American White Pelican (n)	Hérons (n)	Unknown (n)	Total (n)
<u>Columbia River Estuary</u>							
East Sand Island	24,042	6,855				2,053	32,950
Rice Island	5,392						5,392
Pilings Rice Island		210					210
<u>Dalles Dam Reservoir</u>							
Little Memaloose Island			728				728
Little Miller Island			3,412				3,412
<u>John Day Dam Reservoir</u>							
Three Mile Canyon Island	1,256		66			167	1,489
<u>McNary Dam Reservoir</u>							
Crescent Island	3,363					1,122	4,485
Badger Island				99		14	113
Foundation Island	1,628						1,628
Richland Island			1,195				1,195
Island 18			355		16		371
<u>Potholes Reservoir</u>							
Solstice Island	1,647						1,647
Total	37,328	7,065	5,756	99	16	3,356	53,620

a. Detection reaches in the basin and all PIT-tag detection locations in the reach.

Table 3. The total number of PIT tags released into the Columbia River Basin by migration year and the percentage of these tags detected on piscivorous bird colonies.

Migration Year ^a	Unknown		Chinook		Coho		Steelhead		Sockeye		Total	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
1987	12,997	0.1	7,755	0.1			5,166	0.4	1,934	0.1	27,852	0.2
1988	7,793	0.3	19,849	0.2			17,029	0.8	145		44,816	0.5
1989	2,137	0.5	88,040	0.2			32,335	0.8	3,979	0.1	126,491	0.4
1990			73,754	0.1	3		23,659	0.9	7,441	0.1	104,857	0.3
1991			79,530	0.2	6,040	0.6	23,286	0.7	8,578	0.1	117,434	0.3
1992			72,144	0.3	4,455	1.1	29,514	0.9	12,400	0.1	118,513	0.5
1993			132,464	0.4	5	20.0	34,543	2.3	33,440	0.1	200,452	0.7
1994			242,388	1.1			143,185	2.7	3,884	0.3	389,457	1.6
1995			478,488	1.1	10	20.0	80,499	3.5	8,134	0.4	567,131	1.4
1996			333,242	1.5	5,338	1.0	80,391	4.3	16,347	0.6	435,318	2.0
1997			440,354	1.5	47,359	4.2	127,003	6.8	4,267	0.8	618,983	2.8
1998			768,025	1.8	76,009	4.7	85,250	11.5	21,108	1.0	950,392	2.9
1999	2		1,080,387	2.1	60,960	4.4	353,659	9.4	13,243	1.4	1,508,251	3.9
2000	2,338	0.2	936,569	2.7	95,272	4.2	241,217	9.9	8,707	1.7	1,284,103	4.2
Total	25,267	0.2	4,752,989	1.7	295,451	4.2	1,276,736	6.9	143,607	0.5	6,494,050	2.8

a. Migration year designated by the researcher responsible for tagging and uploading the data to the PIT-Tag Information System (PTAGIS) database.

nesting season. Tag-reading depth efficiencies for the flat-plate antenna were 99, 98, 95, and 86% at depths of 0, 2.5, 5, and 7.5 cm, respectively. Tag-reading depth efficiencies for the pole-mounted antennas were 100, 100, 100, and 97% at depths of 0, 2.5, 5, and 7.5 cm, respectively.

DISCUSSION

The modification of a water-based, 134.2-kHz PIT-tag detection system to two land-based systems was effective in detecting PIT tags deposited on piscivorous bird colonies. Large numbers of tags were detected by both flat-plate and pole-mounted antennas in various substrates and locations. Previous efforts to sift PIT tags by hand on Rice Island had indicated that the majority of tags were on or just under the surface (K. Collis, Real Time Research Inc., Pers. commun., March 2000). Tag-reading depth of the 134.2-kHz flat-plate antenna improved from the 400-kHz flat-plate antenna, detecting 86% compared to 19% of tags planted at 7.5 cm (Ryan et al. 2001).

The 134.2-kHz pole-mounted antenna also showed a high reading efficiency at 7.5 cm (97 %); however, this cannot be compared to the 400-kHz pole-mounted antennas because reading-depth efficiencies were not conducted on the 400-kHz pole-mounted antennas. This tag-reading depth information, along with the high tag-detection efficiency (>90%), suggests that both of the 134.2-kHz antennas detected a high percentage of available PIT tags from the sites sampled.

The detection of 53,620 juvenile salmonid PIT tags on bird colonies throughout the Columbia River Basin from salmonids released in migration year 2000 results in a total of more than 180,000 PIT tags detected since sampling started in 1998. Tags have been recovered from migration year 1987, the first year juvenile salmonids were PIT tagged in the Columbia River (Ryan et al. 2001), through migration year 2000.

These recoveries provide a substantial database that has been uploaded into PTAGIS and can now be used by researchers and managers to probe questions important to the recovery of listed salmonid stocks. For example, Ryan et al. (in prep) are evaluating the susceptibility of juvenile salmonids to avian predators in the estuary, by looking at losses to terns and cormorants by salmonid species, location, rearing history (hatchery vs. wild), migration history (transported vs. in-river), and passage history (multiple passages through hydropower bypass systems).

The recovery of PIT tags on bird colonies has also been used to estimate survival through Columbia River Power System dams such as The Dalles Dam (Dawley et al. 2000, Absolon et al. in press). Expanding the size and duration of the current database through the continued collection of PIT-tag data will enable additional analyses to better

understand interactions between juvenile salmonids and predators in the estuary, with potential benefits of management actions to reduce these losses and aid the recovery of listed salmonids. In addition, the continued sampling of piscivorous bird colonies upstream from the estuary will lend the same insight into the impacts piscivorous birds are having on juvenile salmonids in the lower and mid-Columbia River.

Although more than 180,000 PIT-tag codes were detected on nesting colonies during the last 3 years, higher detection numbers will not necessarily translate to more accurate estimates of juvenile salmonid losses to piscivorous birds. The ratio of PIT tags deposited over water and on non-nesting land sites to those deposited on nesting sites is unknown, and we have no information on whether bird digestive systems affect PIT-tag detection, or the deterioration rate of tags after deposition on land. Therefore, estimates of predation based only on colony detections are minimum estimates.

Future research should explore methods to quantify the deposition rate of PIT tags from juvenile salmonids known to have been preyed upon by piscivorous birds, along with establishing the deterioration rate of PIT tags during avian digestion and after deposition on a colony site. Answering these questions would lead to greater accuracy for estimating avian predation on juvenile salmonids.

Millions of dollars are spent annually to tag and monitor juvenile salmonids emigrating from the Columbia River Basin to gather information to recover endangered salmonids. This research has demonstrated that data from a significant portion of these tags can be readily collected on piscivorous bird colonies at a low cost with no impact to either predator or prey. These data will be analyzed to address many questions, including whether avian predation rates vary between stocks (Ryan et al. in prep., Collis et al. 2001). Monitoring of piscivorous bird colonies should continue; a long-term database of avian predation on Columbia River Basin salmonids should be developed to help in the recovery of listed salmonids.

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APPENDIX TABLES

Appendix Table A1. Migration year 2000 juvenile spring/summer chinook PIT tags released into the Columbia River Basin. Separated by hatchery, wild, and unknown rear types. Release sites and codes are as cited in the PIT Tag Information System (PTAGIS) specification document.

Release site ^a	Release code ^b	Hatchery (n)	Wild (n)	Unknown (n)
Unknown Site	UNKNOWN		10	
American River	AMERR		1,770	
Bear Valley Creek	BEARVC		837	
Big Creek	BIGC		1,090	
Bonneville Dam (Gatewells)	BO1GWL			3,327
Bonneville Dam PH2	BO2	64		134
Bonneville Dam (Bypass pipe)	BO2BYP	409		515
Camas Creek	CAMASC		763	
Capehorn Creek	CAPEHC		423	
Carson Hatchery	CARS	14,992		
Catherine Creek	CATHEC		2,108	
Catherine Creek Pond	CATHEP	3,980		
Crooked Fork Creek Trap	CFCTRP		1,787	
Chamberlain Creek	CHAMBC		4	
Chandler Canal	CHANDL	2,585	1,967	
Clark Flat Acclimation Pond	CLARFP	14,767		
Clear Creek	CLEARC	750	329	
North Fork Clearwater River	CLWRNF	47,745		
Crooked River Pond	CROOKP	300		
Crooked River Trap	CROTRP	2	395	
Easton Acclimation Pond	EASTOP	14,881		
Elk Creek	ELKC		660	
Fish Creek	FISHC		1	
Fish Creek Trap	FISTRP	1	602	
Grande Ronde River Pond	GRANDP	985		
Grande Ronde River	GRANDR	1,398	2,869	
Herd Creek	HERDC		315	
Imnaha River	IMNAHR	398	1,449	
Imnaha River Weir	IMNAHW	20,821	1,985	
Imnaha Trap	IMNTRP	2,420	5,869	
Imeques Acclimation Pond	IMQP	3,730	56	
Jack Creek Acclimation Pond	JACKCP	8,819		
John Day River	JDAR		1,626	
North Fork John Day River	JDARNF		227	
Johnson Creek	JOHNSC	8043	912	
Johnson Creek Trap	JOHTRP	1	5481	2

Appendix Table A1. Continued.

Release site	Release code	Hatchery (n)	Wild (n)	Unknown (n)
Knox Bridge	KNOXB	48,309		
Kooskia National Fish Hatchery	KOOS	746		
Lake Creek	LAKEC		2,765	
Leaburg Dam (Bypass Pipe)	LEABYP		3,000	
Leavenworth National Fish Hatchery	LEAV	7,399		
Lookingglass Creek	LOOKGC	2,591	64	
Loon Creek	LOONC		719	
Lostine River Pond	LOSTIP	7,926		
Lostine River	LOSTIR		1,921	
Lower South Fork Salmon River Trap	LSFTRP		3,506	
Marsh Creek	MARSHC		554	
Marsh Creek Trap	MARTRP		2,448	
McKenzie Hatchery	MCKE	1,000		
McKenzie River	MCKER	67	650	
Meadow Creek	MEADOC	112	508	
Minam River	MINAMR		998	
Minthorn Acclimation Pond	MINP		1	
Newsome Creek	NEWSOC	42	2,012	
Okanogan River	OKANR	968		
Pahsimeroi Pond	PAHP	500		
Pahsimeroi River Trap	PAHTRP		2,282	
Papoose Creek	PAPOOC		388	
Pete King Creek	PETEKC		2	
Powell Rearing Ponds	POWP	301		
Rapid River Hatchery	RAPH	47,748		
Red River	REDR	300		
Red River Trap	REDTRP	23	2,249	
Rock Island Dam	RIS	22,506		
Rosa Dam	ROSAD	1,949	2,106	
Rocky Reach Dam	RRE	22,602		
East Fork Salmon River	SALREF		1027	
South Fork Salmon River	SALRSF		1010	
Salmon Trap	SALTRP	45		

Appendix Table A1. Continued.

Release site	Release code	Hatchery (n)	Wild (n)	Unknown (n)
Sawtooth Trap	SAWTRP	1,004	1,559	
Secesh River	SECESR		2,962	
Selway River	SELWYR		2	
South Fork Salmon River Trap	SFSTRP		6,228	
Slate Creek	SLATEC		11	
Snake Trap	SNKTRP	25		
Storm Creek	STORMC		4	
Sulfur Creek	SULFUC		838	
The Dalles (Sluiceway)	TDAICE			22,231
The Dalles (Flowway)	TDASPF			22,137
The Dalles (Tailrace)	TDASPT			22,755
The Dalles (Turbine)	TDATRB			22,705
Umatilla River	UMAR	2,211		
Valley Creek	VALEYC		1,009	
Wells Hatchery	WELH	5,997		
White Sand Creek	WHITSC		302	
Willamette River	WILLR	134	801	
Winthrop National Fish Hatchery	WINT	7,490		
Yakima River	YAKIMR	6,078	3,897	
West Fork Yankee Fork	YANKWF		1,021	
Total		336,043	83,672	93,806

a. Release sites from the PIT Tag Information System specification document.

b. Release site codes from the PIT Tag Information System specification document.

Appendix Table A2. Migration year 2000 juvenile fall chinook PIT tags released into the Columbia River Basin. Separated by hatchery, wild, and unknown rear types. Release sites and codes are as designated in PITAGIS database (PSMFC 1996).

Release site ^a	Release code ^b	Hatchery (n)	Wild (n)	Unknown (n)
Unknown Site	UNKNOWN		9,884	
Big Canyon Creek Acclimation Facility	BCCAP	17,423		
Bonneville Dam PH1	BO1	207		
Bonneville Dam PH2	BO2	598		
Bonneville Dam (Bypass Pipe)	BO2BYP	115		1,061
Chandler Canal	CHANDL	4,051	600	
Captain John Rapids Acclimation Pond	CJRAP	3,489		
Columbia River	COLR		1,083	
Ice Harbor Dam (Flowway)	IHRSPF	8,929		
Ice Harbor Dam (Tailrace)	IHRTAL	8,876		
Lower Granite Dam	LGR	50		
Lower Granite Dam (Returned To River)	LGRRRR		1	
Lyons Ferry Hatchery	LYFE	2,466		
McNary Dam (Gatewell)	MCNGWL			26,386
McNary Dam (Tailrace)	MCNTAL	2		23,423
Pendleton Acclimation Pond	PENP	4,693		
Pittsburg Landing Acclimation Facility	PLAP	8,478		
Priest Rapids Dam	PRDH	3,001		
Ringold Hatchery	RINH	3,090		
Snake River	SNAKER	14,905		
Snake Trap	SNKTRP	156		
The Dalles (Sluiceway)	TDAICE			39,877
The Dalles (Flowway)	TDASPF			40,000
The Dalles (Tailrace)	TDASPT			40,779
The Dalles (Turbine)	TDATRB			41,205
Thornhollow Acclimation Pond	THOP	2,791		
Three Mile Falls Dam (Tailrace)	TMFTAL	75		
Tucannon River	TUCR		555	
Umatilla River	UMAR	3,767		
Yakima River	YAKIMR	1,003	1,379	
Total		88,165	13,502	212,731

a. Release sites from the PIT Tag Information System specification document.

b. Release site codes from the PIT Tag Information System specification document.

Appendix Table A3. Migration year 2000 juvenile unknown chinook PIT tags released into the Columbia River Basin. Separated by hatchery, wild, and unknown rear types.

Release site^a	Release code^b	Hatchery (n)	Wild (n)	Unknown (n)
Clearwater River	CLWR			35
Ice Harbor Dam (Flowway)	IHRSPF	11,735		
Ice Harbor Dam (Tailrace)	IHTAL	11,687		
Lower Granite Dam (Returned To River)	LGRRRR	89	58,775	
Rock Island Dam	RIS	2,887		5,175
Rocky Reach Dam	RRE	2,572	64	1,486
Salmon Trap	SALTRP	4,648	2,035	
Snake River	SNAKER		1,209	4
Snake Trap	SNKTRP	3,642	1,939	364
Three Mile Falls Dam (Tailrace)	TMFTAL		3	
Umatilla River	UMAR	100	201	
Total		37,360	64,226	7,064

a. Release sites from the PIT Tag Information System specification document.

b. Release site codes from the PIT Tag Information System specification document.

Appendix Table A4. Migration year 2000 juvenile steelhead PIT tags released into the Columbia River Basin. Separated by hatchery, wild, and unknown rear types.

Release site ^a	Release code ^b	Hatchery (n)	Wild (n)	Unknown (n)
Three Links Creek	3LINKC		22	
American River	AMERR	300	737	
Bargamin Creek	BARGAC		567	
Big Canyon Facility	BCANF	3,513		
Buckaroo Creek	BCKROC		54	
Bear Valley Creek	BEARVC		21	
Beaver Creek	BEAVEC		69	
Bedrock Creek	BEDRKC	6		
Big Creek	BIGC		110	
Big Canyon Creek	BIGCAC	15		
East Fork Birch Creek	BIRCHE		163	
West Fork Birch Creek	BIRCHW		94	
Bonneville Dam PH1	BO1	340		
Bonneville Dam PH2	BO2	608		
Bonn. Dam (Bypass Pipe)	BO2BYP	408		
Bonifer Springs Acclimation Pond	BONP	822		
Boulder Creek Trap	BOUTRP		5	
Camas Creek	CAMASC		95	
Catherine Creek	CATHEC		1,499	
Crooked Fork Creek Trap	CFCTRP		868	
Chamberlain Creek	CHAMBC		2,660	
West Fork Chamberlain Creek	CHAMWF		62	
Clear Creek	CLEARC	1,200	228	
Clearwater River	CLWR	699		
North Fork Clearwater River	CLWRNF	782		
South Fork Clearwater River	CLWRSF	1,200		
Colombia River	COLR	25,742		
Cottonwood Acclimation Pond	COTP	354		
Cottonwood Creek	COTTWC	24	21	
Crooked Creek	CROOC		156	
Crooked River Pond	CROOKP	300		
Crooked River Trap	CROTRP		61	
Dayton Acclimation Pond	DAYP	349		
Dworshak National Fish Hatchery	DWOR	4,208		
Fish Creek	FISHC		662	
Fish Creek Trap	FISTRP		8,963	
West Fork Gedney Creek	GEDCWF		137	
Gedney Creek	GEDNEC		699	
Grande Ronde River	GRANDR	2,951	1,773	

Appendix Table A4. Continued.

Release site ^a	Release code ^b	Hatchery (n)	Wild (n)	Unknown (n)
Hells Canyon Dam	HCD	299		
Horse Creek	HORSEC		552	
Imnaha River	IMNAHR	104	220	
Imnaha River Weir	IMNAHW		1	
Imnaha Trap	IMNTRP	5,742	4,517	
Imeques Acclimation Pond	IMQP		907	
Jacks Creek	JACKSC	25		
John Day Dam (Bypass Pipe)	JDABYP	394		
John Day River	JDAR		1	
Johns Creek	JOHNC		9	
Johnson Creek	JOHNSC		40	
Johnson Creek Trap	JOHTRP		715	
Lake Creek	LAKEC		165	
Lemhi River	LEMHIR	300		
Lower Granite Dam (Bypass Pipe)	LGRBYP	606		
Lower Granite Dam (Returned To River)	LGRRRR	20,159	70,722	
Lower Granite Dam (Transported)	LGRRXR	200		
Little Goose Dam (Bypass Pipe)	LGSBYP	389		
Lick Creek	LICKC		621	
Lower Monumental Dam (Bypass Pipe)	LMNBYP	401		
Lochsa River	LOCHSA		213	
Lolo Creek	LOLOC		549	
Lookingglass Creek	LOOKGC		680	
Loon Creek	LOONC		155	
Lostine River	LOSTIR		1,310	
Little Salmon River	LSALR	599		
Lower South Fork Salmon River Trap	LSFTRP		336	
Little Sheep Facility	LSHEEF	758		
Lyons Ferry Hatchery	LYFE	345		
Marsh Creek Trap	MARTRP		112	
McKay Creek	MCKAYC		119	
McNary Dam (Bypass Pipe)	MCNBYP	355		
Meadow Creek	MEADOC		4	
Minthorn Acclimation Creek	MINP	2,158	19	
Moonshine Creek	MOONSC		16	
Newsome Creek	NEWSOC	300	703	
O'Hara Creek	OHARAC		125	
Pahsimeroi River Trap	PAHTRP	303	589	
Panther Creek	PANT2C		88	
Pearson Creek	PEARSC		58	
Potlach River	POTR		6	

Appendix Table A4. Continued.

Release site ^a	Release code ^b	Hatchery (n)	Wild (n)	Unknown (n)
Rapid River	RAPR		56	
Red River Rearing Pond	REDP	300		
Red River Trap	REDTRP		257	
Rock Island Dam	RIS	2,746	1,200	1
Rocky Reach Dam	RRE	1,192	3	
Salmon River	SALR	597		
East Fork Salmon River	SALREF		30	
North Fork Salmon River	SALRNF	300		
Salmon Trap	SALTRP	2,126	334	
Sawtooth Hatchery	SAWT	2,408		
Sawtooth Trap	SAWTRP		31	
Secesh River	SECESR		314	
Selway River	SELWYR		63	
South Fork Salmon River Trap	SFSTRP		248	
Slate Creek	SLATEC		589	
Snake Trap	SNKTRP	3,698	1,296	
Squaw Creek	SQAWC		103	
Squaw Creek Acclimation Pond	SQUAWP	1,791		
Storm Creek	STORMC		768	
Tenmile Creek	TENMIC		48	
Three Mile Falls Dam (Tailrace)	TMFTAL		1	
Trout Creek	TROUTC		424	
Tucannon River	TUCR	866	563	
Umatilla River	UMAR	1,804	18	
Wallowa Hatchery	WALH	1,196		
Wells Dam (Tailrace)	WELTAL	33,547		
White Sand Creek	WHITSC		428	
Wind River	WIND2R		945	
Wind River, Washington	WINDR		332	
West Fork Yankee Fork	YANKWF		58	
Total		129,829	111,387	1

a. Release sites from the PIT Tag Information System specification document.

b. Release site codes from the PIT Tag Information System specification document.

Appendix Table A5. Migration year 2000 juvenile coho PIT tags released into the Columbia River Basin. Separated by hatchery, wild, and unknown rear types.

Release site ^a	Release code ^b	Hatchery (n)	Wild (n)	Unknown (n)
Buckaroo Creek	BCKROC		30	
Bonneville Dam (Bypass pipe)	BO2BYP	1		1
Chandler Canal	CHANDL			168
Clark Flat Acclimation Pond	CLARFP	492		
Eldorado Creek	ELDORC	1,520		
Imeqes Pond	IMQP		77	
Jack Creek Acclimation Pond	JACKCP	3,174		
Kooskia Naional Fish Hatchery	KOOS	803		
Lapwai Creek	LAPC	1,500		
Leavenworth National Fish Hatchery	LEAV	7,947		
Lower Granite Dam (Returned to river)	LGRRRR		4	
Lolo Creek	LOLOC	17		
McKay Creek	MCKAYC		365	
Meadow Creek	MEADOC	1,565		
Minthorn Acclimation Pond	MINP		17	
Natches River	NATCHR	9,958		
Potlatch River	POTR	2,998		
Rock Island Dam	RIS			4
Snake Trap	SNKTRP	1		
Squaw Creek	SQAWC		47	
The Dalles (Sluiceway)	TDAICE			11,318
The Dalles (Flowway)	TDASPF			11,419
The Dalles (Tailrace)	TDASPT			11,445
The Dalles (Turbine)	TDATRB			11,362
Winthrop National Fish Hatchery	WINT	8,937		
Yakima River	YAKIMR	9,901		201
Total		48,814	540	45,918

a. Release sites from the PIT Tag Information System specification document.

b. Release site codes from the PIT Tag Information System specification document.

Appendix Table A6. Migration year 2000 juvenile sockeye PIT tags released into the Columbia River Basin. Separated by hatchery, wild, and unknown rear types.

Release site^a	Release code^b	Hatchery (n)	Wild (n)	Unknown (n)
Alturas Lake Creek	ALTULC	181	422	
Alturus Lake	ALTURL	1,554		
Bonneville Dam (Bypass pipe)	BO2BYP			959
Pettit Lake	PETTL	2,004		
Redfish Lake	REDFL	1,578		
Redfish Lake Creek	REDFLC	366	107	
Rock Island Dam	RIS	42	656	
Redfish Lake Creek Trap	RLCTRP	147		
Rocky Reach Dam	RRE	1		690
Total		5,873	1,185	1,649

a. Release sites from the PIT Tag Information System specification document.

b. Release site codes from the PIT Tag Information System specification document.

Appendix Table B1. Migration year 2000 juvenile spring/summer chinook PIT tags detected on the East Sand Island cormorant colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR		1		LOSTIP	15		
BEARVC		1		LOSTIR		3	
BIGC		1		LSFTRP		4	
BO1GWL			26	MARSHC		1	
BO2			1	MARTRP		7	
BO2BYP	4		2	MEADOC		2	
CAMASC		1		MINAMR		1	
CARS	75			NEWSOC		3	
CATHEC		3		OKANR	7		
CATHEP	7			PAHP	1		
CFCTRP		2		PAHTRP		2	
CHANDL	5	2		POWP	2		
CLARFP	15			RAPH	136		
CLEARC	5	1		REDTRP		2	
CLWRNF	209			RIS	82		
EASTOP	10			ROSDAD		3	
ELKC		1		RRE	89		
FISTRP		3		SALREF		1	
GRANDR	2	9		SAWTRP	3	4	
IMNAHR	1	2		SECESR		2	
IMNAHW	57	1		SFSTRP		2	
IMNTRP	6	15		SULFUC		1	
IMQP	5			TDAICE			126
JACKCP	8			TDASPF			151
JDAR		3		TDASPT			153
JOHNSC	12	1		TDATRB			113
JOHTRP		8		UMAR	4		
KNOXB	130			VALEYC		2	
KOOS	1			WELH	7		
LAKEC		3		WINT	30		
LEAV	19			YAKIMR	16	9	
LEMHIW		4		YANKWF		2	
LOLOC	1	4		Total	944	112	29
LOOKGC	4						

* Release site codes from the PIT Tag Information System specification document.

Appendix Table B2. Migration year 2000 juvenile fall and unknown chinook PIT tags detected on the East Sand Island cormorant colony. Separated by hatchery, wild, and unknown rear types.

Release Site*	Fall chinook			Release Site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
UNKNOWN		26		IHRSPF	62		
BCCAP	73			IHRTAL	46		
BO1	1			LGRRRR	1	289	
BO2	5			RIS	13		11
BO2BYP	3		27	RRE	7		2
CHANDL	12	1		SALTRP	15	12	
CJRAP	12			SNKTRP	16	8	2
COLR		1		UMAR	1		
IHRSPF	45			Total	161	309	15
IHRTAL	55						
LYFE	12						
MCNGWL			207				
MCNTAL			174				
PENP	28						
PLAP	41						
PRDH	11						
RINH	17						
TDAICE			398				
TDASPF			403				
TDASPT			433				
TDATRB			373				
THOP	16						
TMFTAL	1						
TUCR		2					
UMAR	19						
YAKIMR	1						
Total	352	30	2,015				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table B3. Migration year 2000 juvenile steelhead PIT tags detected on the East Sand Island cormorant colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR		2		LMNBYP	4		
BCANF	2			LOCHSA		2	
BO1	3			LOLOC		3	
BO2	3			LOSTIR		5	
BO2BYP	3			LSALR	2		
BONP	2			LSHEEF	1		
CATHEC		1		LYFE	2		
CFCTRP		4		MCNBYP	4		
CHAMBC		7		MINP	5		
CLEARC	11	2		NEWSOC	1		
CLWRSF	9			PAHTRP		1	
COLR	153			REDP	3		
COTP	1			RIS	14	11	
CROOC		1		RRE	8		
DWOR	10			SALR	1		
FISHC		4		SALRNF	5		
FISTRP		60		SALTRP	7	1	
GRANDR	16	14		SAWT	2		
HORSEC		2		SECESR		3	
IMNAHR		2		SFSTRP	27	13	
IMNTRP	14	21		SQUAWP	3		
IMQP		4		STORMC		2	
JDABYP	5			TUCR	3	4	
JOHTRP		2		UMAR	14		
LEMHIR	1			WALH	2		
LGRBYP	7			WELTAL	200		
LGRRRR	124	836		WHITSC		2	
LGSBYP	2			Total	670	1,004	0

* Release site codes from the PIT Tag Information System specification document.

Appendix Table B4. Migration year 2000 juvenile coho and sockeye PIT tags detected on the East Sand Island cormorant colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CLARFP	2			ALTULC		1	
JACKCP	2			ALTURL	4		
KOOS	2			BO2BYP			7
LEAV	26			PETTL	5		
NATCHR	13			REDFL	1		
TDAICE			145	RIS		3	
TDASPF			139	RRE			1
TDASPT			121	Total	10	4	8
TDATRB			131				
WINT	21						
YAKIMR	9						
Total	75	0	536				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table C1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on the East Sand Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR		6		LOONC		3	
BEARVC		1		LOSTIP	133		
BIGC		1		LOSTIR		8	
BO1GWL			49	LSFTRP		8	
BO2	2			MARTRP		10	
BO2BYP	13		11	MEADOC		2	
CAMASC		3		MINAMR		1	
CAPEHC		1		NEWSOC		1	
CARS	188			OKANR	8		
CATHEC		2		PAHP	9		
CATHEP	87			PAHTRP		9	
CFCTRP		3		PAPOOC		3	
CHANDL	41	11		POWP	6		
CLARFP	124			RAPH	710		
CLEARC	12	2		REDR	4		
CLWRNF	749			REDTRP		10	
CROOKP	7			RIS	312		
CROTRP		2		ROSAD	8	2	
EASTOP	147			RRE	336		
GRANDP	10			SALREF		4	
GRANDR	41	15		SALRSF		1	
HERDC		2		SALTRP	14	6	
IMNAHR	3	5		SAWTRP		12	
IMNAHW	282	3		SULFUC		1	
IMNTRP	43	21		TDAICE			447
IMQP	37			TDASPF			426
JACKCP	105			TDASPT			444
JDAR		4		TDATRB			371
JOHNSC	83	1		UMAR	26		
JOHTRP		9		VALEYC		2	
KNOXB	794			WELH	28		
KOOS	12			WHITSC		2	
LAKEC		4		WINT	53		
LEAV	110			YAKIMR	57	26	
LEMHIW		3		YANKWF		7	
LOLOC	1	8		Total	4,599	225	1,748
LOOKGC	4						

* Release site codes from the PIT Tag Information System specification document.

Appendix Table C2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on the East Sand Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
UNKNOWN		36		IHRSPF	328		
BCCAP	62			IHRTAL	342		
BO2	4			LGRRRR	1	400	
BO2BYP			25	RIS	60		36
CHANDL	35	1		RRE	37		11
CJRAP	31			SALTRP	72	11	
COLR		1		SNAKER		5	
IHRSPF	133			SNKTRP	41	14	9
IHRTAL	126			UMAR	2	1	
LYFE	26			Total	883	431	56
MCNGWL			283				
MCNTAL			216				
PENP	44						
PLAP	70						
PRDH	28						
RINH	22						
SNAKER	6						
SNKTRP	1						
TDAICE			675				
TDASPF			667				
TDASPT			679				
TDATRB			605				
THOP	22						
TUCR		1					
UMAR	30						
YAKIMR	5	9					
Total	645	48	3,150				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table C3. Migration year 2000 juvenile steelhead PIT tags detected on the East Sand Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR	18	1		LMNBYP	7		
BARGAC		5		LOCHSA		5	
BCANF	69			LOLOC		13	
BIGCAC	1			LOOKGC		10	
BO1	5			LOSTIR		19	
BO2	18			LSALR	28		
BO2BYP	28			LSFTRP		11	
BONP	8			LSHEEF	35		
CATHEC		12		LYFE	10		
CFCTRP		6		MARTRP		1	
CHAMBC		26		MCKAYC		3	
CLEARC	41	9		MCNBYP	12		
CLWR	5			MINP	43	1	
CLWRSF	41			NEWSOC	17	5	
COLR	1,257			PAHTRP	17	10	
COTNWC	3			REDP	15		
COTP	13			RIS	176	49	1
CROOC		2		RRE	48		
CROOKP	22			SALR	25		
DAYP	4			SALREF		1	
DWOR	230			SALRNF	7		
FISHC		5		SALTRP	99	14	
FISTRP		181		SAWT	134		
GEDCWF		3		SAWTRP		2	
GEDNEC		1		SECESR		1	
GRANDR	134	43		SFSTRP		3	
HCD	7			SLATEC		2	
HORSEC		2		SNKTRP	199	44	
IMNAHR	8	9		SQAWC		1	
IMNTRP	371	219		SQUAWP	40		
IMQP		20		STORMC		6	
JDABYP	20			TUCR	60	38	
JOHTRP		12		UMAR	37		
LEMHIR	16			WALH	57		
LGRBYP	23			WELTAL	1,892		
LGRRRR	1,091	2,893		WHITSC		6	
LGRRXR	13			WINDR		1	
LGSBYP	13			Total	6,417	3,696	1
LICKC		1					

* Release site codes from the PIT Tag Information System specification document.

Appendix Table C4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the East Sand Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CLARFP	14			ALTULC	1		
ELDORC	1			ALTURL	4		
IMQP		1		BO2BYP			7
JACKCP	128			PETTL	15		
KOOS	22			REDFL	1		
LAPC	8			REDFLC	4		
LEAV	243			RIS	1	5	
MCKAYC		1		RRE			8
MEADOC	1			Total	26	5	15
NATCHR	207						
POTR	7						
TDAICE			292				
TDASPF			273				
TDASPT			278				
TDATRB			250				
WINT	226						
YAKIMR	137		4				
Total	994	2	1,097				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table D1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on East Sand Island from locations with unknown predator species. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR			1	LEMHIW			1
BEARVC			1	LOLOC			2
BIGC			1	LOOKGC	1		
BO1GWL		3		LOSTIP	11		
BO2BYP		1		LSFTRP			3
CAMASC			1	MARTRP			1
CARS	24			PAHP	1		
CATHEC			2	PAHTRP			2
CHANDL	1			RAPH	32		
CLARFP	4			RIS	15		
CLEARC			1	RRE	22		
CLWRNF	46			SAWTRP			1
CROOKP	1			SFSTRP			3
EASTOP	1			SULFUC			1
GRANDR	1		1	TDAICE		31	
IMNAHW	9			TDASPF		37	
IMNTRP	1		5	TDASPT		37	
JACKCP	1			TDATRB		35	
JDAR			1	WELH	2		
JOHNSC	4			WINT	1		
JOHTRP			2	YAKIMR	4		2
KNOXB	36			Total	222	144	33
LAKEC			1				
LEAV	4						

* Release site codes from the PIT Tag Information System specification document.

Appendix Table D2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on East Sand Island from locations with unknown predator species. Separated by hatchery, wild, and unknown rear types.

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
UNKNOWN			32	IHRSPF	21		
BCCAP	20			IHRTAL	14		
BO2	5			LGRRRR		76	
BO2BYP	1	11		RIS	5		13
CHANDL	4		1	RRE	3		1
CJRAP	8			SALTRP	3	1	
IHRSPF	8			SNKTRP	4	2	
IHRTAL	16			Total	50	79	14
LYFE	4						
MCNGWL		116					
MCNTAL		109					
PENP	4						
PLAP	7						
PRDH	4						
RINH	6						
TDAICE		140					
TDASPF		128					
TDASPT		136					
TDATRB		134					
THOP	6						
UMAR	10						
YAKIMR			1				
Total	103	774	34				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table D3. Migration year 2000 juvenile steelhead PIT tags detected on East Sand Island from locations with unknown predator species.
Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BO2	1			LOCHSA		1	
CATHEC		3		LOLOC		1	
CFCTRP		1		LSHEEF	1		
CHAMBC		1		MINP	1		
CLEARC	3			NEWSOC		1	
COLR	35			REDP	1		
COTP	1			RIS	2	2	
DAYP	1			RRE	2		
DWOR	3			SALRNF	1		
FISTRP		15		SALTRP	1	1	
GRANDR	5	8		SAWT	3		
HORSEC		2		SELWYR		2	
IMNTRP	7	1		SLATEC		1	
IMQP		1		SNKTRP	8	6	
JDABYP	1			TUCR	3	1	
JOHTRP		2		UMAR	1		
LEMHIR	1			WALH	1		
LGRBYP	1			WELTAL	56		
LGRRRR	32	249		WHITSC		1	
LGSBYP	2			Total	172	300	0
LICKC		2					

* Release site codes from the PIT Tag Information System specification document.

Appendix Table D4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on East Sand Island from locations with unknown predator species. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
JACKCP	2			BO2BYP		1	
LEAV	9			PETTL	2		
NATCHR	7			REDFLC	1		
POTR	1			RIS			1
TDAICE			27	RRE		1	
TDASPF			22	Total	3	2	1
TDASPT			20				
TDATRB			20				
WINT	5						
YAKIMR	5						
Total	29	0	89				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table E1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on the Rice Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release Site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR		3		LOOKGC	3		
BO1GWL			28	LOSTIP	24		
BO2			3	LOSTIR		1	
BO2BYP	4		3	LSFTRP		5	
CARS	132			MARTRP		5	
CATHEC		3		MEADOC	1		
CATHEP	16			OKANR	2		
CFCTRP		4		PAHP	2		
CHAMBC				PAHTRP		5	
CHANDL	6	5		POWP	1		
CLARFP	25			RAPH	161		
CLEARC	1			REDR	1		
CLWRNF	276			REDTRP		6	
CROTRP		1		RIS	36		
EASTOP	23			ROSAD	2	1	
FISTRP		1		RRE	38		
GRANDP	4			SALREF		2	
GRANDR	9	7		SALRSF		1	
IMNAHR		2		SALTRP	1		
IMNAHW	57	1		SAWTRP	3	3	
IMNTRP	9	6		SECESR		1	
IMQP	5			SFSTRP		7	
JACKCP	15			TDAICE			109
JDAR		2		TDASPF			98
JOHNSC	21	1		TDASPT			98
JOHTRP		5		TDATRB			72
KNOXB	188			UMAR	3		
KOOS	5			WELH	3		
LAKEC		2		WINT	13		
LEAV	15			YAKIMR	17	5	
LEMHIR		1		YANKWF		1	
LOLOC	1			Total	1,123	87	411

* Release site codes from the PIT Tag Information System specification document.

Appendix Table E2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on the Rice Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
UNKNOWN		7		IHRSPF	63		
BCCAP	22			IHRTAL	70		
BO2	9			LGRRRR		109	
BO2BYP	1		11	RIS	16		7
CHANDL	5			RRE	6		3
CJRAP	12			SALTRP	13	2	
IHRSPF	34			SNAKER		1	
IHRTAL	24			SNKTRP	9	3	3
LYFE	3			Total	177	115	13
MCNGWL			77				
MCNTAL			64				
PENP	7						
PLAP	25						
PRDH	10						
RINH	9						
SNAKER	1						
TDAICE			133				
TDASPF			157				
TDASPT			156				
TDATRB			164				
THOP	2						
UMAR	2						
YAKIMR	1						
Total	167	7	762				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table E3. Migration year 2000 juvenile steelhead PIT tags detected on the Rice Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR	1			LMNBYP	1		
BARGAC		3		LOCHSA		1	
BCANF	19			LOLOC		2	
BCKROC		1		LOSTIR		6	
BIGCAC	1			LSALR	9		
BO1	1			LSFTRP		5	
BO2	6			LSHEEF	13		
BO2BYP	3			LYFE	2		
BONP	1			MCKAYC		1	
CATHEC		3		MCNBYP	2		
CFCTRP		4		MINP	4		
CHAMBC		7		NEWSOC	2	3	
CLEARC	9			PAHTRP	4		
CLWRSF	9			REDP	6		
COLR	214			RIS	35	13	
COTP	1			RRE	10		
CROOKP	4			SALR	4		
DWOR	54			SALRNF	5		
FISHC		3		SALTRP	20	5	
FISTRP		78		SAWT	18		
GEDCWF		2		SAWTRP		2	
GRANDR	33	13		SLATEC		1	
HCD	3			SNKTRP	32	12	
IMNAHR	2	1		SQAWC		2	
IMNTRP	96	51		SQUAWP	14		
IMQP		1		STORMC		1	
JDABYP	5			TROUTC		1	
JOHTRP		2		TUCR	7	7	
LEMHIR	3			UMAR	10		
LGRBYP	6			WALH	10		
LGRRRR	229	674		WELTAL	317		
LGRRXR	1			WHITSC		1	
LGSBYP	3			Total	1,229	907	0
LICKC		1					

* Release site codes from the PIT Tag Information System specification document.

Appendix Table E4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the Rice Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CLARFP	1			ALTURL	1		
ELDORC	1			BO2BYP			4
JACKCP	13			PETTL	1		
KOOS	4			RIS		2	
LAPC	4			RRE			2
LEAV	29			Total	2	2	6
NATCHR	31						
POTR	3						
TDAICE			70				
TDASPF			53				
TDASPT			61				
TDATRB			54				
WINT	32						
YAKIMR	26		2				
Total	144	0	240				

* Release site codes from the PIT Tag Information System specification document.

**Appendix Table F1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on the Little Memaloose Island gull colony.
Separated by hatchery, wild, and unknown rear types.**

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CARS	3			LEAV	1		
CATHEP	1			LEMHIW		1	
CFCTRP		1		LOSTIP	4		
CHANDL	2	1		PAHTRP		1	
CLARFP	8			RAPH	11		
CLWRNF	11			RIS	20		
EASTOP	8			RRE	32		
GRANDR	1	1		SALREF		1	
IMNAHW	6			SULFUC		1	
IMNTRP	1	1		TDAICE			12
JACKCP	4			TDASPF			22
JDAR		1		TDASPT			1
JDARNF		1		TDATRB			7
JOHNSC	2			WELH	1		
JOHTRP		1		WINT	2		
KNOXB	20			YAKIMR	4	2	
LAKEC		1		Total	142	14	42

* Release site codes from the PIT Tag Information System specification document.

**Appendix Table F2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on the Little Memaloose Island gull colony.
Separated by hatchery, wild, and unknown rear types.**

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BCCAP	4			IHRSPF	14		
CHANDL	1			IHRTAL	11		
CJRAP	3			LGRRRR		22	
COLR		1		RIS	4		3
IHRSPF	9			RRE	6		
IHRTAL	15			SALTRP	2	1	
LYFE	2			SNKTRP	3	4	
MCNGWL			9	Total	40	27	3
MCNTAL			16				
PENP	5						
PLAP	3						
PRDH	1						
RINH	3						
SNKTRP	1						
TDAICE			19				
TDASPF			35				
TDATRB			32				
TUCR		1					
UMAR	2						
Total	49	2	111				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table F3. Migration year 2000 juvenile steelhead PIT tags detected on the Little Memaloose Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR	1			PAHTRP		1	
BCANF	4			REDP	1		
CLEARC	4			RIS	7	1	
CLWR	2			RRE	4		
CLWRSF	3			SALR	2		
COLR	30			SALRNF	1		
DWOR	7			SALTRP	4		
FISTRP		3		SAWT	9		
GRANDR	5	2		SAWTRP		1	
HCD	1			SNKTRP	1		
IMNTRP	12	6		TUCR	1		
JOHTRP		1		UMAR	1		
LEMHIR	1			WALH	2		
LGRRRR	26	36		WELTAL	44		
LSALR	1			Total	175	51	0
LSHEEF	1						

* Release site codes from the PIT Tag Information System specification document.

Appendix Table F4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the Little Memaloose Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CLARFP	1			PETTL	2		
JACKCP	4			REDFL	2		
LAPC	1			REDFLC	1	1	
LEAV	15			Total	5	1	0
NATCHR	4						
POTR	1						
TDAICE			1				
TDASPF			16				
TDASPT			4				
TDATRB			5				
WINT	5						
YAKIMR	8		1				
Total	39	0	27				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table G1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on the Little Miller Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR		1		LOSTIP	15		
CARS	2			LOSTIR		2	
CATHEC		1		LSFTRP		1	
CATHEP	10			MARSHC		1	
CFCTRP		1		MARTRP		2	
CHANDL	7	5		MINAMR		1	
CLARFP	14			OKANR	2		
CLEARC	1			PAHTRP		3	
CLWRNF	47			RAPH	34		
CROOKP	1			REDR	1		
CROTRP		1		REDTRP		2	
EASTOP	20			RIS	58		
ELKC		1		ROSD		1	
GRANDR	5	2		RRE	55		
IMNAHR	2	1		SAWTRP	3	2	
IMNAHW	10			SFSTRP		3	
IMNTRP	6	3		SULFUC		2	
IMQP	6			TDAICE			10
JACKCP	9			TDASPF			33
JDAR		5		TDASPT			3
JOHNSC	10			TDATRB			25
JOHTRP		2		WELH	2		
KNOXB	62			WINT	15		
LAKEC		1		YAKIMR	12	8	
LEAV	19			YANKWF		1	
LEMHIW		1		Total	428	56	71
LOLOC		2					

* Release site codes from the PIT Tag Information System specification document.

Appendix Table G2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on the Little Miller Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
UNKNOWN		4		IHRSPF	48		
BCCAP	17			IHRTAL	41		
CHANDL	10			LGRRRR		70	
CJRAP	10			RIS	9		2
IHRSPF	32			RRE	6		1
IHRTAL	43			SALTRP	9	1	
LYFE	3			SNAKER		1	
MCNGWL			68	SNKTRP	6	4	
MCNTAL			41	Total	119	76	3
PENP	9						
PLAP	21						
PRDH	2						
RINH	5						
TDAICE			8				
TDASPF			38				
TDASPT			5				
TDATRB			25				
THOP	5						
UMAR	9						
YAKIMR		2					
Total	166	6	185				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table G3. Migration year 2000 juvenile steelhead PIT tags detected on the Little Miller Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR	5			LGRRRR	312	364	
BARGAC		1		LGSBYP	1		
BCANF	23			LOLOC		2	
BCKROC		1		LOOKGC		1	
BEDRKC	1			LOSTIR		8	
BONP	2			LSALR	9		
CATHEC		2		LSFTRP		1	
CHAMBC		9		LSHEEF	14		
CLEARC	11	2		MINP	8		
CLWR	1			NEWSOC	8	1	
CLWRSF	9			PAHTRP	3	3	
COLR	210			REDP	6		
COTNWC	1			RIS	20	11	
COTP	2			RRE	17		
CROOKP	6			SALR	8		
DAYP	1			SALRNF	5		
DWOR	83			SALTRP	37	5	
FISHC		1		SAWT	51		
FISTRP		19		SLATEC		2	
GEDNEC		1		SNKTRP	73	9	
GRANDR	46	16		SQAWC		1	
HCD	3			SQUAWP	27		
IMNAHR	3	2		STORMC		1	
IMNTRP	135	57		TUCR	7	7	
IMQP		3		UMAR	8		
JDABYP	1			WALH	18		
JOHTRP		1		WELTAL	341		
LEMHIR	2			WHITSC		1	
LGRBYP	4			Total	1,522	532	0

* Release site codes from the PIT Tag Information System specification document.

Appendix Table G4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the Little Miller Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
JACKCP	18			ALTULC		1	
KOOS	5			ALTURL	4		
LAPC	2			BO2BYP			1
LEAV	44			PETTL	12		
MEADOC	1			REDFL	1		
NATCHR	35			REDFLC	5	1	
POTR	2			RIS		4	
TDAICE			7	RRE			2
Total	168	0	49	Total	22	6	3

* Release site codes from the PIT Tag Information System specification document.

Appendix Table H1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on the Three Mile Canyon Island tern colony.
Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CATHEC		2		LOSTIP	7		
CATHEP	1			LOSTIR		1	
CHANDL	1	2		LSFTRP		1	
CLARFP	7			MARTRP		1	
CLEARC	2	1		PAHTRP		2	
CLWRNF	69			PAPOOC		1	
CROOKP	2			POWP	1		
EASTOP	6			RAPH	39		
GRANDR		7		REDR	1		
IMNAHR	1			REDTRP		1	
IMNAHW	14	2		RIS	2		
IMNTRP	3	15		ROSAD	1	5	
IMQP	5			RRE	6		
JACKCP	1			SALREF		1	
JOHNSC	5			SAWTRP	3		
JOHTRP		4		SFSTRP		1	
KNOXB	50			UMAR	2		
KOOS	3			WINT	5		
LEAV	4			YAKIMR	10	2	
LEMHIW		2		Total	252	51	0
LOOKGC	1						

* Release site codes from the PIT Tag Information System specification document.

**Appendix Table H2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on the Three Mile Canyon Island tern colony.
Separated by hatchery, wild, and unknown rear types.**

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BCCAP	8			IHRSPF	28		
CJRAP	2			IHRTAL	30		
PENP	4			LGRRRR		53	
PLAP	7			RIS	3		
THOP	1			RRE			1
UMAR	1			SALTRP	9	2	
Total	23	0	0	SNKTRP	5	3	
				Total	75	58	1

* Release site codes from the PIT Tag Information System specification document.

Appendix Table H3. Migration year 2000 juvenile steelhead PIT tags detected on the Three Mile Canyon Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BONP	1			LOLOC		4	
CHAMBC		4		LOOKGC		1	
CLEARC	5			LOSTIR		3	
CLWRSF	9			LSFTRP		2	
COLR	90			MCKAYC		1	
COTNWC	1			MINP	3		
CROOKP	3			PAHTRP	1	1	
DAYP	2			REDP	2		
DWOR	20			RIS	6	2	
FISHC		1		RRE	6		
FISTRP		28		SALR	2		
GEDNEC		2		SALTRP	5	5	
GRANDR	13	5		SAWT	6		
IMNTRP	10	26		SECESR		1	
IMQP		4		SNKTRP	11	4	
JOHTRP		2		SQAWC		1	
LEMHIR	3			STORMC		1	
LGRBYP	2			TUCR	8	1	
LGRRRR	64	289		UMAR	12		
LGSBYP	5			WALH	3		
LICKC		2		WELTAL	101		
LMNBYP	1			Total	395	390	0

* Release site codes from the PIT Tag Information System specification document.

Appendix Table H4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the Three Mile Canyon Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BCKROC		1			NO DETECTIONS		
LAPC	1						
LEAV	3						
NATCHR	3						
YAKIMR	3						
Total	10	1	0				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table II. Migration year 2000 juvenile spring/summer, fall, and unknown chinook salmon PIT tags detected from the Three Mile Canyon Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CATHEP	1			IHRSPF	3		
CLWRNF	5			IHRTAL	2		
EASTOP	1			LGRRRR		7	
IMNAHW	1			SALTRP	2		
JOHNSC	1			UMAR		1	
KNOXB	4			Total	7	8	0
KOOS	1						
MARTRP		1					
RAPH	1						
RRE	1						
SAWTRP	1						
Total	17	1	0				
Fall chinook							
	Hatchery (n)	Wild (n)	Unknown (n)				
BCCAP	1						
IHRSPF	1						
MCNGWL			2				
MCNTAL			1				
PENP	2						
PLAP	2						
Total	6	0	3				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table I2. Migration year 2000 juvenile steelhead PIT tags detected on the Three Mile Canyon Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BCANF	2			LOSTIR		1	
BONP	1			LSALR	3		
CATHEC		1		LSHEEF	2		
CHAMBC		1		MCNBYP	1		
CLEARC	1			MINP	2		
COLR	20			SALR	2		
COTNWC	1			SALTRP	4		
COTP	1			SAWT	7		
CROOKP	2			SLATEC		1	
DWOR	7			SNKTRP	7		
FISTRP		3		SQUAWP	3		
GRANDR	5	1		TUCR	1	3	
IMNTRP	11	4		UMAR	3		
IMQP		2		WELTAL	24		
LGRRRR	26	27		Total	136	44	0

* Release site codes from the PIT Tag Information System specification document.

Appendix Table I3. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the Three Mile Canyon Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
IMQP		1		RRE			1
LAPC	1			Total	0	0	1
LEAV	1						
NATCHR	2						
WINT	4						
YAKIMR	1						
Total	9	1	0				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table J1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on the Crescent Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR		2		LOOKGC	4		
BIGC		2		LOONC		1	
CATHEC		2		LOSTIP	12		
CATHEP	6			LOSTIR		2	
CFCTRP		1		LSFTRP		3	
CHANDL	6	3		MARTRP		2	
CLARFP	15			MINAMR		1	
CLEARC	7	1		NEWSOC		4	
CLWRNF	102			PAHTRP		10	
CROOKP	2			RAPH	64		
EASTOP	3			REDTRP		7	
FISTRP		1		RIS	5		
GRANDP	1			ROSD		1	
GRANDR	9	8		RRE	4		
IMNAHR	1	1		SALREF		1	
IMNAHW	24	4		SALRSF		1	
IMNTRP	11	17		SAWTRP	2	3	
IMQP	4			SECESR		1	
JACKCP	3			SFSTRP		6	
JOHNSC	9			SULFUC		1	
JOHTRP		1		TDASPF			1
KNOXB	78			WELH	1		
KOOS	3			WINT	3		
LAKEC		2		YAKIMR	5	4	
LEAV	2			YANKWF		3	
LEMHIW		2		Total	387	103	1
LOLOC	1	5					

* Release site codes from the PIT Tag Information System specification document.

Appendix Table J2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on the Crescent Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
UNKNOWN		6		IHRSPF	91		
BCCAP	9			IHRTAL	51		
CHANDL	9	3		LGRRRR		115	
CJRAP	3			RIS	2		3
IHRSPF	58			RRE	6		3
IHRTAL	41			SALTRP	16	4	
LYFE	11			SNAKER		1	
MCNGWL			4	SNKTRP	10	5	2
MCNTAL			2	Total	176	125	8
PLAP	19						
PRDH	1						
RINH	7						
SNKTRP	1						
THOP	1						
TUCR		1					
UMAR	1						
YAKIMR		3					
Total	161	13	6				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table J3. Migration year 2000 juvenile steelhead PIT tags detected on the Crescent Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR	4			LOLOC		5	
BCANF	32			LOOKGC		2	
BEAVEC		1		LOSTIR		10	
CATHEC		5		LSALR	7		
CFCTRP		2		LSFTRP		4	
CHAMBC		9		LSHEEF	9		
CLEARC	18	2		LYFE	6		
CLWR	3			MARTRP		1	
CLWRSF	22			MCNBYP	4		
COLR	163			MINP	1		
COTP	5			NEWSOC	2	2	
CROOC		1		PAHTRP	2		
CROOKP	2			REDP	3		
DWOR	71			RIS	20	9	
FISHC		6		RRE	7		
FISTRP		80		SALR	8		
GEDNEC		3		SALRNF	3		
GRANDR	46	17		SALTRP	37	4	
HCD	5			SAWT	24		
IMNAHR	3	2		SELWYR		1	
IMNTRP	79	68		SLATEC		1	
JACKSC	1			SNKTRP	53	18	
JOHTRP		6		SQUAWP	24		
LEMHIR	3			STORMC		1	
LGRBYP	21			TUCR	18	9	
LGRRRR	298	622		UMAR	1		
LGSBYP	12			WALH	20		
LICKC		2		WELTAL	269		
LMNBYP	15			Total	1,321	898	0
LOCHSA		5					

* Release site codes from the PIT Tag Information System specification document.

Appendix Table J4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the Crescent Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CLARFP	1			ALTULC	2		
JACKCP	24			ALTURL	5		
KOOS	14			PETTL	2		
LEAV	21			REDFLC	1		
MEADOC	9			RIS		2	
NATCHR	29			Total	10	2	0
POTR	4						
WINT	25						
YAKIMR	23		2				
Total	150	0	2				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table K1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on the Crescent Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CATHEP	4			LOSTIP	10		
CFCTRP		1		NEWSOC		1	
CHANDL		1		PAHP	1		
CLARFP	2			POWP	2		
CLEARC	1			RAPH	27		
CLWRNF	33			REDTRP		1	
ELKC		1		RIS	16		
GRANDR	1	1		RRE	6		
IMNAHW	7			SAWTRP	2		
IMNTRP	1	6		SECESR		1	
JOHNSC	8			SFSTRP		1	
JOHTRP		1		WINT	1		
KNOXB	38			YAKIMR	2		
LEAV	1			Total	166	15	0
LOOKGC	3						

* Release site codes from the PIT Tag Information System specification document.

Appendix Table K2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on the Crescent Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
UNKNOWN		1		IHRSPF	17		
BCCAP	8			IHRTAL	7		
CHANDL	2			LGRRRR		26	
IHRSPF	2			RIS	1		
IHRTAL	3			SALTRP	2		
MCNGWL			6	SNKTRP	1		
PENP	5			Total	28	26	0
PLAP	10						
THOP	4						
TUCR		1					
UMAR	2						
Total	36	2	6				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table K3. Migration year 2000 juvenile steelhead PIT tags detected on the Crescent Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release Site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BARGAC		1		LGSBYP	1		
BCANF	12			LOSTIR		1	
BONP	2			LSALR	2		
CATHEC		1		LSHEEF	5		
CHAMBC		7		LYFE	1		
CLEARC	4	1		MINP	4		
CLWR	2			NEWSOC	6		
CLWRSF	9			PAHTRP		2	
COLR	126			REDP	2		
COTP	2			RIS	9	3	
CROOKP	1			RRE	6		
DWOR	36			SALR	3		
FISHC		1		SALTRP	10		
FISTRP		4		SAWT	8		
GRANDR	20	4		SLATEC		1	
IMNAHR		1		SNKTRP	24	2	
IMNTRP	40	11		SQUAWP	6		
JACKSC	1			TUCR	7	3	
JOHTRP		3		UMAR	3		
LEMHIR	1			WALH	4		
LGRBYP	2			WELTAL	183		
LGRRRR	140	91		Total	682	137	0

* Release site codes from the PIT Tag Information System specification document.

Appendix Table K4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the Crescent Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release Site*	Coho			Release Site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BCKROC		1		ALTULC	1		
JACKCP	1			ALTURL	1		
KOOS	1			Total	2	0	0
LAPC	3						
LEAV	4						
NATCHR	4						
WINT	7						
YAKIMR	1						
Total	21	1	0				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table L1. Migration year 2000 juvenile spring/summer, fall, and unknown chinook salmon PIT tags detected on the Badger Island pelican colony. Separated by hatchery, wild, and unknown rear types.

Spring/summer chinook				Unknown chinook			
Release site*	Hatchery (n)	Wild (n)	Unknown (n)	Release site	Hatchery (n)	Wild (n)	Unknown (n)
GRANDP	1			IHRSPF	1		
JACKCP	2			IHRTAL	1		
KNOXB	1			LGRRRR		2	
SFSTRP		1		Total	2	2	0
Total	4	1	0				

Fall chinook			
Release site	Hatchery (n)	Wild (n)	Unknown (n)
UNKNOW		1	
N			
IHRSPF	4		
LYFE	1		
PENP	1		
RINH	1		
YAKIMR	1		
Total	8	1	0

* Release site codes from the PIT Tag Information System specification document.

Appendix Table L2. Migration year 2000 juvenile steelhead, coho, and sockeye salmon PIT tags detected on the Badger Island pelican colony. Separated by hatchery, wild, and unknown rear types. No tags from sockeye salmon were detected on the Badger Island colony.

Release site*	Steelhead			Release Site	Coho		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BCANF	3			LEAV	1		
COLR	2			NATCHR	2		
CROOKP	2			Total	3	0	0
DWOR	12						
GRANDR	3	1					
IMNTRP	3						
LEMHIR	1						
LGRRRR	22	4					
LSALR	1						
NEWSOC	1						
PAHTRP	1						
RIS			1				
SALR	1						
SALTRP	5						
SAWT	4						
SNKTRP	7						
SQUAWP	1						
WELTAL	4						
Total	73	5	1				

Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)
NO DETECTIONS			

* Release site codes from the PIT Tag Information System specification document.

Appendix Table M1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on the Foundation Island cormorant and heron colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BEARVC		2		LOOKGC	5		
BIGC		1		LOSTIP	4		
CATHEC		4		LOSTIR		1	
CATHEP	4			MARTRP		1	
CHANDL	6	4		MEADOC		1	
CLARFP	19			NEWSOC		1	
CLWRNF	55			PAHTRP		1	
CROTRP		1		RAPH	26		
EASTOP	22			REDR	1		
ELKC		1		RIS	4		
GRANDP	2			ROSD	1	4	
GRANDR		2		RRE	4		
IMNAHR		2		SALREF		1	
IMNAHW	12	1		SAWTRP		3	
IMNTRP	7	7		SECESR		1	
IMQP	6			SFSTRP		5	
JACKCP	5			TDAICE			1
JOHNSC	7			TDASPT			1
JOHTRP		3		UMAR	4		
KNOXB	36			WHITSC		1	
KOOS	3			WINT	8		
LAKEC		1		YAKIMR	15	12	
LEAV	1			Total	257	62	2
LEMHIW		1					

* Release site codes from the PIT Tag Information System specification document.

Appendix Table M2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on the Foundation Island cormorant and heron colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
UNKNOWN		61		IHRSPF	6		
N							
BCCAP	12			IHTAL	2		
CHANDL	40			LGRRRR		104	
CJRAP	6			RIS	2		
IHRSPF	5			RRE	1		
LYFE	1			SALTRP	4	7	
PENP	2			SNKTRP	10	3	2
PLAP	16			Total	25	114	2
PRDH	4						
RINH	10						
THOP	3						
UMAR	4						
YAKIMR		3					
Total	103	64	0				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table M3. Migration year 2000 juvenile steelhead PIT tags detected on the Foundation Island cormorant and heron colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR	2			LOLOC		4	
BCANF	9			LOSTIR		6	
BIRCHE		1		LSALR	4		
BO1	1			LSHEEF	1		
CFCTRP		2		LYFE	4		
CHAMBC		4		MARTRP		1	
CLEARC	12	5		MINP	6		
CLWRSF	8			NEWSOC	1	1	
COLR	8			PAHTRP	2	3	
COTP	4			REDP	4		
CROOKP	3			RIS	1		
DAYP	14			RRE	2		
DWOR	35			SALR	7		
FISTRP		29		SALRNF	2		
GRANDR	29	10		SALTRP	15	1	
HCD	2			SAWT	15		
HORSEC		1		SECESR		1	
IMNAHR	2	2		SFSTRP		1	
IMNTRP	35	33		SNKTRP	40	14	
IMQP		4		SQUAWP	14		
JOHTRP		2		STORMC		1	
LGRBYP	1			TUCR	3	3	
LGRRRR	147	381		UMAR	5		
LGSBYP	4			WALH	5		
LMNBYP	3			WELTAL	5		
LOCHSA		1		Total	455	511	0

* Release site codes from the PIT Tag Information System specification document.

Appendix Table M4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the Foundation Island cormorant and heron colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CLARFP	1			PETTL	2		
JACKCP	4			Total	2	0	0
LAPC	1						
LEAV	1						
MEADOC	1						
NATCHR	16						
WINT	3						
YAKIMR	4						
Total	31	0	0				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table N1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on the Richland Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR		2		LOSTIP	5		
CAMASC		1		LSFTRP		2	
CATHEP	4			NEWSOC		1	
CHANDL	22	7		RAPH	34		
CLARFP	45			REDTRP		1	
CLWRNF	24			RIS	17		
EASTOP	28			ROSAD	3		
GRANDR		1		RRE	15		
IMNAHR		1		SAWTRP		1	
IMNAHW	14			SFSTRP		2	
IMNTRP	1	3		WINT	1		
JACKCP	16			YAKIMR	41	18	
JOHNSC	5			YANKWF		1	
KNOXB	40			Total	316	41	0
LEAV	1						

* Release site codes from the PIT Tag Information System specification document.

Appendix Table N2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on the Richland Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
UNKNOWN		2		IHRSPF	10		
BCCAP	13			IHTAL	3		
CHANDL	6	14		LGRRRR		45	
CJRAP	3			RIS	2		1
IHRSPF	1			SALTRP	9	2	
MCNGWL			2	SNKTRP	4	2	1
PENP	1			Total	28	49	2
PLAP	5						
PRDH	1						
THOP	1						
YAKIMR		14					
Total	31	30	2				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table N3. Migration year 2000 juvenile steelhead PIT tags detected on the Richland Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
AMERR	1			LOSTIR		1	
BCANF	6			LSALR	2		
CATHEC		1		LSHEEF	1		
CHAMBC		3		MINP	1		
CLEARC	3			PAHTRP		1	
CLWRSF	5			REDP	2		
COLR	111			RIS	20	2	
COTP	2			RRE	1		
CROOKP	1			SALR	2		
DWOR	31			SALRNF	1		
FISHC		1		SALTRP	1		
FISTRP		7		SAWT	7		
GRANDR	9	3		SNKTRP	16		
HCD	1			SQUAWP	2		
IMNAHR	1			TUCR	4	2	
IMNTRP	25	4		WALH	2		
LGRBYP	2			WELTAL	186		
LGRRRR	67	70		Total	514	95	0
LMNBYP	1						

* Release site codes from the PIT Tag Information System specification document.

Appendix Table N4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the Richland Island gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CHANDL			5	ALTURL	2		
JACKCP	14			PETTL	1		
KOOS	1			RRE			1
LAPC	1			Total	3	0	1
LEAV	5						
NATCHR	31						
WINT	2						
YAKIMR	19		5				
Total	73	0	10				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table O1. Migration year 2000 juvenile spring/summer chinook salmon PIT tags detected on the Island 18 gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Spring/summer chinook			Release site	Spring/summer chinook (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CATHEC		1		LOSTIP	2		
CATHEP	1			PAPOOC		1	
CHANDL	10	1		RAPH	3		
CLARFP	43			REDR	1		
CLWRNF	4			RIS	11		
EASTOP	19			ROSA	1		
GRANDR	1			RRE	10		
IMNAHR		1		WELH	1		
JACKCP	16			WINT	3		
JOHNSC	2			YAKIMR	13	3	
KNOXB	6			Total	154	7	0
LEAV	7						

* Release site codes from the PIT Tag Information System specification document.

Appendix Table O2. Migration year 2000 juvenile fall and unknown chinook salmon PIT tags detected on the Island 18 gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Fall chinook			Release site	Unknown chinook		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
UNKNOWN		1		IHRSPF	1		
BCCAP	3			LGRRRR		4	
CHANDL	10	6		SNKTRP	1		
CJRAP	1			Total	2	4	0
PENP	2						
RINH	6						
THOP	1						
YAKIMR		5					
Total	23	12	0				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table O3. Migration year 2000 juvenile steelhead PIT tags detected on the Island 18 gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Steelhead (cont.)		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
BCANF	1			NEWSOC	1		
BONP	1			RRE	1		
CFCTRP		1		SALRNF	2		
CHAMBC		1		SALTRP	1		
CLEARC	1			SAWT	1		
COLR	22			SNKTRP	3		
DWOR	5			SQUAWP	2		
FISTRP		1		TUCR	1		
GRANDR	3			UMAR	1		
IMNTRP	1	2		WALH	1		
LGRRRR	11	10		WELTAL	20		
LOSTIR		2		Total	79	17	0

* Release site codes from the PIT Tag Information System specification document.

Appendix Table O4. Migration year 2000 juvenile coho and sockeye salmon PIT tags detected on the Island 18 gull colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Coho			Release site	Sockeye		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
CHANDL			2		NO DETECTIONS		
CLARFP	1						
JACKCP	7						
LEAV	3						
NATCHR	22						
WINT	2						
YAKIMR	20						
Total	55	0	2				

* Release site codes from the PIT Tag Information System specification document.

Appendix Table P1. Migration year 2000 juvenile spring/summer, fall, and unknown chinook salmon PIT tags detected on the Solstice Island tern colony. Separated by hatchery, wild, and unknown rear types.

Spring/summer chinook				Fall chinook			
Release site*	Hatchery (n)	Wild (n)	Unknown (n)	Release site	Hatchery (n)	Wild (n)	Unknown (n)
CLWRNF	1			UNKNOWN		1	
KNOXB	1			BCCAP	1		
LEAV	14			PRDH	1		
OKANR	3			Total	2	1	0
RIS	48						
RRE	53						
WELH	3			Release site	Hatchery (n)	Wild (n)	Unknown (n)
WINT	12						
Total	135	0	0	IHRTAL	1		
				LGRRRR		1	
				RIS	10		3
				RRE	11	1	2
				Total	22	2	5

Appendix Table P2. Migration year 2000 juvenile steelhead, coho, and sockeye salmon PIT tags detected on the Solstice Island tern colony. Separated by hatchery, wild, and unknown rear types.

Release site*	Steelhead			Release site	Coho		
	Hatchery (n)	Wild (n)	Unknown (n)		Hatchery (n)	Wild (n)	Unknown (n)
COLR	402			JACKCP	1		
DWOR	2			LEAV	54		
GRANDR		1		WINT	66		
IMNTRP	1			YAKIMR	2		
LGRRRR	2	1		Total	123	0	0
RIS	74	23					
RRE	29			Release site	Sockeye		
SALTRP	1				Hatchery (n)	Wild (n)	Unknown (n)
SLATEC		1		REDFLC		1	
WELTAL	817			RRE			2
Total	1,328	26	0	Total	0	1	2

* Release site codes from the PIT Tag Information System specification document.